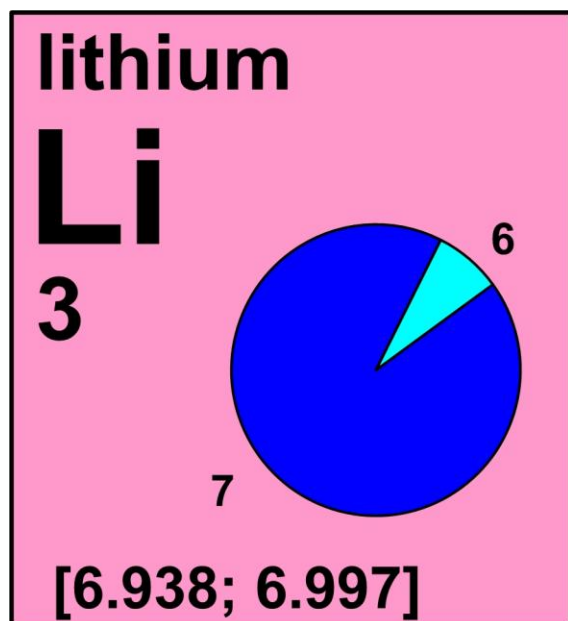
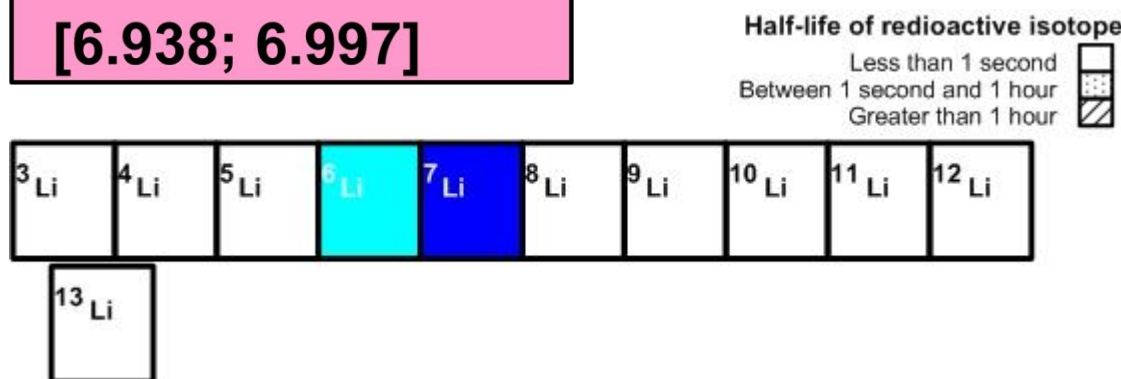


lithium



Stable isotope	Atomic mass*	Mole fraction
⁶ Li	6.015 122 795	0.0759
⁷ Li	7.016 004 55	0.9241

* Atomic mass given in unified atomic mass units, u.



Important applications of stable and/or radioactive isotopes

Isotopes in medicine

- ⁶Lithium is used in several medical applications including sodium and renal physiology, membrane transport and psychiatric diseases.
- ⁷Lithium is a product of cancer therapy known as BNCT (boron neutron capture therapy). ¹⁰B is attached to tumor seeking compounds and introduced to a body. After the ¹⁰B has attached or entered tumor cells, a beam of low-energy neutrons is introduced to the affected areas. Once ¹⁰B captures a neutron and is irradiated, it disintegrates into high-energy heavy-charged particles (⁷Li ions and ⁴He), destroying the nearby cells, primarily cancer cells, leaving the adjacent normal cells unaffected.

Isotopes in the environment

- Looking at variations in ⁷Li/⁶Li ratios can help to determine the source of some water. Lithium has been found to fractionate during hydrothermal processes. Because of this,

isotopic analysis of lithium in water can help distinguish water derived from marine sedimentary rocks and water derived from hydrothermally altered igneous rocks.

- 2) Lithium isotopes have also become a source of quality control for some lithium-based laboratory reagents, which have been shown to be artificially depleted in ^6Li . Being depleted in ^6Li has caused these reagents to not accurately reflect the atomic and molecular weights of these reagents. Some of these reagents have found their way in to surface water and can be easily identified. It has been thought that much of the ^6Li was removed from lithium reagents and used in nuclear weapon development. The leftover and abundant quantities of ^7Li were then sold to chemical companies and processed into reagents and sold.

Isotopes in industry

- 1) ^7Li (as Hydroxide Monohydrate), is responsible for alkalizing the coolant (maintaining the pH level of coolant) used in pressurized water reactors.
- 2) When bombarded with neutrons, ^6Li and also ^7Li are used to produce the radioisotope tritium so that it can be used in biochemistry research.
- 3) Lithium plays a role in the construction of a thermonuclear bomb. A thermonuclear bomb uses the energy released when two light atomic nuclei i.e. ^2H (deuterium) or ^3H (tritium) fuse to form a heavier nucleus, i.e. helium. ^6Li is used in the form of ^6Li deuteride in thermonuclear weapons as fusion fuel by bombarding the isotope with slow neutrons to produce helium and tritium (^3H).

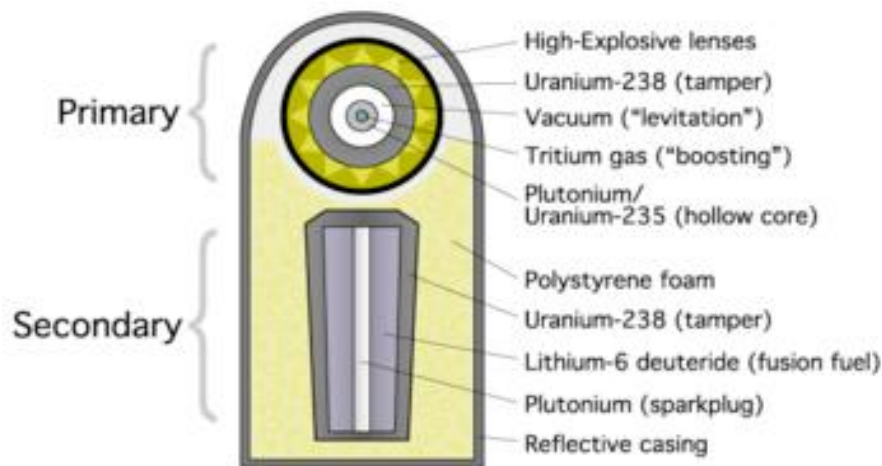


Figure 1: Teller-Ulam hydrogen bomb Design.

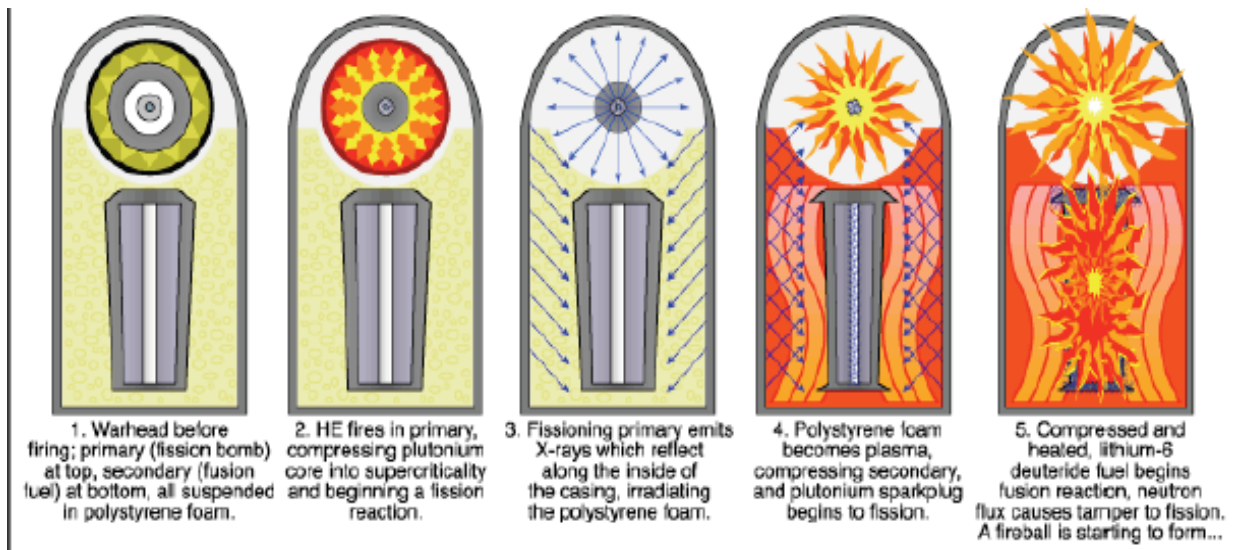


Figure 2: Diagram of how the Teller-Ulam hydrogen bomb works.